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HOME VISITS AND TELEPHONE CONTACTS FOR PREVENTING EARLY CHILDHOOD CARIES COULD BE COST EFFECTIVE

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Abstract

Are dental care instructions provided to parents over the phone or instructions and child dental examination during home visits every 6 months more cost-effective in preventing early childhood caries than no intervention?

SUMMARY

Subjects

This analysis included data from 2 previously published studies.[1,2] Mothers from a public maternity health clinic in Queensland, Australia were asked to participate. Children aged 6–48 months from this group were randomly assigned for home-visit (n = 529) or telephone-based (n = 185) interventions by dental therapists. A convenience sample (n = 40) of children from the same area was used as a control.

Key risk/study factor

Each intervention was carried out 5 times at months 6, 12, 18, 30, and 42. Clinical assessments were performed at months 24, 26, 48, and 60. Children were assigned to 1 of 2 health states ("caries" and "healthy") depending on the presence of caries. A Markov cohort model using these 2 health states was used to estimate outcomes for the home-visit intervention, telephone-based intervention, and control group.

Main outcome measure

Program costs (per person, including travel), treatment costs (anesthesia, crowns, extractions, medication, and restorations), indirect costs (travel and loss of income), and utilities (a proxy for quality adjusted life year [QALY]) were measured. Incremental cost-effectiveness analysis was performed to compare the 3 groups. Costs were given in US dollars and discounted at 5% annually.

TYPE OF STUDY/DESIGN
Markov model and Monte Carlo simulation where parameters are obtained from longitudinal intervention study, program data, and published data

Main results

Compared with the control group, incremental costs per 100 children over a period of 5.5 years were estimated to be $144,709 less for children receiving the telephone-based intervention and $167,032 less for children receiving home visits. Furthermore, the telephone-based and home-visit interventions would prevent 113 and 100 carious teeth (per 100 children), respectively, over that period. Sensitivity analysis showed general anesthesia costs had the largest impact on the incremental cost-effectiveness analysis.

Conclusions

Both home-visit and telephone-based interventions by dental therapists were estimated to be cost-effective in preventing early childhood caries (ECC).

COMMENTARY AND ANALYSIS

The American Academy of Pediatric Dentistry defines ECC as the presence of tooth decay involving any primary tooth in a child aged <6 years.[1] If left untreated, ECC can lead to pain and difficulty in eating, playing, and sleeping.[2] Treatment costs for ECC can be substantial, especially for more severe ECC, which can require extensive treatment under general anesthesia.[3,4] Two analyses of Medicaid claims data[3,5] found that treatment of ECC in the hospital operating room under general anesthesia accounted for a disproportionate share of Medicaid dental expenditures (25% for 2% of children and 45% for 5% of children). In both studies, a large number of teeth (13.7 and 9.6) were treated per child.

Data collected by the U.S. National Health and Nutrition Examination Survey indicate that among children aged 2–5 years ECC prevalence increased by 3.7 percentage points between 1988–1994 and 1999–2004 (24.2% vs 27.9).[6] The mean number of carious teeth was about 4 in both periods.6,* In the most recent cycle of U.S. National Health and Nutrition Examination Survey 2011–2012, prevalence was 22.7%.[7]

This study found that either in-home visits every 6 months that included a dental examination and dental care instruction on oral hygiene conducted by dental therapists or telephone interviews with dental care instruction resulted in substantial cost savings and increased quality of life compared with usual care. In the United States, cost-effectiveness analyses for home visits to prevent asthma have also found that the intervention benefit can exceed program costs.[8] However, these visits often combine education with interventions that reduce the actual risk factor (eg, providing high-efficiency particulate air [HEPA] filters, pest management, or dust mite covers). In this study, although the costs of the in-home visit were twice those of the phone interview, the difference in the effectiveness of the 2 programs was not statistically significant.[9] Given the strong evidence for the effectiveness of fluoride varnish in preventing caries in primary teeth,[10] it is possible that including it during the home visit could have increased cost-effectiveness.

*Authors calculated by dividing mean number decayed and filled primary teeth per child (1.17) by percentage of children with ECC (27.9%).

US children who receive preventive dental services at their recommended frequency[11] would have received all elements of the intervention (eg, examination, dietary counseling) during their dental visit. In addition, if indicated, children would have received fluoride varnish and sealants. Although this study did not report receipt of clinical preventive dental services, the 60-month caries incidence of 60% among controls would suggest children did not routinely receive preventive dental care. The benefit of the interventions in this study could be lower if implemented among children who routinely receive preventive dental care. US data also indicate low dental utilization—in 2012, 25% of children aged <6 years had a past-year dental visit.[12] An analysis of 2009 data further found that among children utilizing dental care about 20% aged <3 years and 40% aged 3–5 years received topical fluoride or sealants.[13] Children can also receive preventive dental care in primary care settings. The U.S. Preventive Services Task Force recommends providing fluoride varnish to all children through age 5 years during primary care visits and prescribing fluoride supplements to children receiving fluoride deficient water.[14] Both of these recommendations have an evidence grade of B, indicating that they can be provided with no out-of-pocket expense by the patient's family.[13] Receipt of fluoride during primary care visits, however, may also be low—a national survey found that 7% of pediatricians who provided preventive services also delivered fluoride varnish.[15]

Some of the assumptions and the high caries risk of children in this study should be considered when determining the generalizability of these findings to other communities. This study assumed that 43% of caries would be treated by extraction and that all extractions required treatment under general anesthesia. An American Dental Association survey in 2005 found that extraction of deciduous teeth accounted for 3% of restorative and surgical procedures provided by pediatric dentists.16,† A survey asking a convenience sample of American and English dentists what treatment plan they would consider for a 5-year-old child with pain in a lower first primary molar found that about 16% of all dentists would consider an extraction using general anesthesia.[17] Finally, implementing this intervention could be more costly for other communities. The dental examination, which was delivered by dental therapists in this study, could require a dentist or dentist's supervision in some US states. The study's assigning productivity losses to parents' time in taking their child to the dentist but not for parents' time in receiving dental care instructions at their home or on the telephone also likely underestimated the cost of the intervention relative to its benefit.

This is one of the few cost-effectiveness analyses in dentistry that is directly comparable with analyses for medicine as it uses a common outcome metric, QALYs. There is limited information on QALYs gained from preventing caries. This study estimated the loss in QALYs by surveying participating parents. Lost QALYs attributable to caries in this study (0.10) was, however, notably higher than the disability adjusted life year value of 0.012 per case of untreated dental caries,[18] suggesting again that these findings may not be generalizable to all communities.

†Authors calculated by dividing extraction of deciduous teeth by sum of total restorative services and surgical services among pediatric dentists.

The findings of this study suggest that telephone calls and home visits by dental therapists every 6 months can be effective in preventing ECC and for certain communities may result in lower health expenditures.

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